

Chapter 4

Examiner Initial Comments

4.1 Information Disclosure Statement

The information disclosure statement (IDS) submitted on 06/22/2004 was filed in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

1 – 1 Applicant Response

These documents, many referenced in the 2004 application show the practical application of Economic Scenario Generators (ESG's) to financial institution risk management and valuation. Insurance companies use ESG's to generate scenarios of economic variables such as yield curves to use in cashflow models. The term Economic Scenario Generator and ESG first appeared in applicant's

paper with Steve Craighead. Applicant began using ESG and Economic Scenario Generator with TM around that time.

<http://www.soa.org/library/research/actuarial-research-clearing-house/1990-99/1997/arch-1/arch97v127.pdf>

"1997 VOL. 1. Economic Scenario Generator for Insurance and Pension. Rational Decision Making Under Uncertainty" by Steve Craighead and Mark Tenney.

This term has been subsequently used by others as well including standards groups, educators at actuarial meetings and vendors.

4.2 Status of Claims

Claims 1-24 are pending in this application. Claims 10-16 are canceled and claims 1,3,4,5,9 and 11 are amended. Claims 17-24 are new.

Chapter 5

Examiner Response to Arguments.

0 – 1 Applicant's arguments, see pgs 29-34 Objection Withdrawn

1. Applicant's arguments, see pgs 29-34, filed 03/30/2009 with respect to the objection to the specification have been fully considered and are persuasive.

The objection of 10/26/2007 has been withdrawn.

0 – 2 Applicant's arguments, see pgs 37-38 Objection Withdrawn

2. Applicant's arguments, see pgs 37-38, filed 03/30/2009 with respect to the numbering of claims 1-16 have been fully considered and are persuasive.

The claim objection of 10/26/2007 has been withdrawn.

0 – 3 Applicant’s arguments, see pg 40 Objection Withdrawn

3. Applicant’s arguments, see pg 40, filed 03/30/2009, with respect to claim 3, 9, 11, 13, and 14 infomalities have been fully considered and are persuasive. The claim objection to 10/26/2007 has been withdrawn.

0 – 4 Applicant’s arguments, see pgs 40-43 Objection Withdrawn

4. Applicant’s arguments, see pgs. 40-43, filed 03/30/2009, with respect to improper dependent form of claims 4,5, and 10, 11, and 12 have been fully considered and are persuasive. The claim objection of 10/26/2007 has been withdrawn.

0 – 5 Applicant’s arguments, see pg 44 Objection Withdrawn

5. Applicant’s arguments, see pg. 44 filed 03/30/2009, with respect to the description of claims 1-16 have been fully considered and are persuasive. The claim objection of 10/26/2007 has been withdrawn.

0 – 6 Applicant's arguments, see pg 45 Objection Withdrawn

6. Applicant's arguments, see pg. 45, filed 03/30/2009, with respect to claims 10-16 have been fully considered and are persuasive. The 101 rejection of 10/26/2007 has been withdrawn.

0 – 7 Applicant's arguments 101 Rejection 1-9 Not Persuasive in re Bilski

7. Applicant's arguments filed 03/30/2009 have been fully considered but they are not persuasive. With regard to the 101 rejection of claims 1-9 the examiner rejected these claims due to lack of patentable utility. With regard to the method claims, the Court of Appeals for the Federal Circuit recently decided in re Bilski that a method claim must meet a specialized, limited meaning to qualify as a patent eligible process claim. The test for a method claim is whether the claimed method is (1) tied to a particular machine or apparatus, or (2) transforms a particular article to a different state or thing.

In the present case the reference to a computer in claim 1 is similar to a reference in the preamble to another statutory class. Without a sufficient

tie in the body of the claim to the machine or apparatus in the preamble the claim is not considered a patent eligible process because the machine or apparatus must impose meaningful limits on the claims scope.

In the present case, the extent to which the computer is used is not defined, therefore a meaningful limit on the scope of the claim cannot be assessed. Additionally, according to MPEP 2107, a claimed invention must have a specific and substantial utility as asserted by the disclosure of the invention.

In the present case, claim 1 is directed towards the simulation of variables using a particular process. Based on the disclosure it cannot be determined what is the specific utility of these variables and if the utility is substantial if there is one. A practical utility is a shorthand way of attributing real world value to a claimed subject matter. In other words, one skilled in the art can use a claimed discovery in a manner which provides some immediate benefit to the public (MPEP 2107.01).

0 – 7.1 Applicant's response i4i patent

I4i patent is 5787449. This patent was recently upheld by CAFC. Its claims make little mention of a computer but were upheld. Thus applicant's use of computer is within the practice upheld by the CAFC.

1. A computer system for the manipulation of the architecture and content of a document having a plurality of metacodes and content by producing a first map of metacodes and their addresses of use in association with mapped content; said system comprising:

- metacode map distinct storage means; means for providing a menu of metacodes to said metacode storage means; and means for compiling said metacodes of the menu by locating, detecting and addressing the metacodes in the document to constitute the map and storing the map in the metacode storage means; and means for resolving the content and the metacode map into the document.

The i4i patent was upheld by the CAFC in late 2009.

<http://www.cafc.uscourts.gov/opinions/09-1504.pdf>

This involved an injunction on Microsoft to sell Microsoft Word and a judgement of 290 million dollars, all upheld. This is an important case with big amounts of money and an injunction of a widely used word processor, and the patent was upheld. The CAFC allowed the claims even though the word computer appears only once in claim one.

Claim 14 is independent and does not have any mention of a computer.

The majority opinion of the CAFC particularly points out claim 14 and states Page 5 of pdf of CAFC opinion, which is numbered as page 4:

The documents content is stored in a data structure called mapped content. Claim 14 is illustrative:

Then the CAFC recites claim 14

14. A method for producing a first map of metacodes and their addresses of use in association with mapped content and stored in distinct map storage means, the method comprising:

providing the mapped content to mapped content storage means; providing a menu of metacodes; and compiling a map of the metacodes in the distinct storage means, by locating, detecting and addressing the metacodes; and providing the document as the content of the document and the metacode map of the document.

Then the CAFC states

Separate storage of a documents structure and content was an improvement over prior technology in several respects. Importantly, it has allowed users to work solely on a documents content or its structure. *Id.* at col.7 ll.6-11, 17-20.

So the majority opinion of the CAFC upholding the i4i patent distinctly points out claim 14 which never mentions the word computer. The opinion praises this claim while upholding it.

0 – 7.2 Applicant's response ESG file size 78 megabytes

Economic scenario generators often involve runs of 1000 or 10000 scenarios of monthly time intervals for 30 to 50 years. One file for example takes 78 megabytes of code. That is with 1000 scenarios, 674 time points including the initial time point with 10 points on the yield curve, i.e. yields of bonds with 10 different maturities, 3 months, 6 months, 1 year, 2,3, 5, 7, 10, 20 and 30 years. This is a typical run and the type of run applicant's company was doing already in the 1990's using the Double Mean Reverting Process ESG.

ESG's could not be done apart from being done on computers. So its an inherent part of their use to be done on computers. Moreover, this is gone over at length in the specification.

0 – 7.3 Extent to which computer used is specified in specification in accordance with MPEP 2111.01 IV. APPLICANT MAY BE OWN LEXICOGRAPHER

Examiner comment

In the present case, the extent to which the computer is used is not defined, therefore a meaningful limit on the scope of the

claim cannot be assessed.

In the specification its stated specifically that terms of calcuation refer to calculation on a computer.

2111.01 Plain Meaning [R-5] - 2100 Patentability

IV. ; APPLICANT MAY BE OWN LEXICOGRAPHER

An applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning by clearly setting forth a definition of the term that is different from its ordinary and customary meaning(s). See *In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994) (inventor may define specific terms used to describe invention, but must do so "with reasonable clarity, deliberateness, and precision" and, if done, must "'set out his uncommon definition in some manner within the patent disclosure' so as to give one of ordinary skill in the art notice of the change" in meaning)

This is done at length in the patent specification.

(Note counter for definition is different from in this amendment)

Starting at Paragraph 0423 Page 15 of pdf of the patent application prepared by USPTO and on the Internet.

Definition 5.1 (Equation) In the context of forming computer or network algorithms, an equation shall have the following meaning. Except where an implicit method is indicated an equation shall have the same meaning as in a programming language like C, C++, FORTRAN, or higher or lower level computer languages. It shall mean the machine or the process as appropriate to the context of the claims for computer related processes, machines or patentable subject matter as in patent office guidelines, 705 type patents, and decisions of the CAFC or other courts. Where an equation is used for an implicit algorithm it means the calculation of the discrepancy of the equation or deviation as appropriate to an implicit algorithm. In the case of stochastic differential equations or partial differential equations or other equations requiring an algorithm, a standard algorithm or an algorithm in the

patent shall be understood as appropriate means unless the context clearly indicates some other meaning. ♠

Note 5.1 (Diagrams as Computer or Process Diagrams) In the context of forming computer algorithms or stating the use of a computer or network a diagram shall have the following meaning. In such context, a diagram or several diagrams shall be understood as referring to processes involving computers, machines or other patentable processes, machines, methods, etc as are common in 705 type patents, patent office guidelines, decisions of the CAFC and other courts. ♠

Definition 5.2 (Function) In the context of forming computer or network algorithms, a function shall have the following meaning. A function in this context means as in C, C++, etc. a set of operations or a computer function or subroutine and the appropriate encoding of it onto a computer. In some cases, an implicit algorithm is indicated by the context or the prior art of this patent. ♠

Note 5.2 (References as Computer Calculations) Where references (i.e. texts like a book or article) are referred to, their use of equations, functions, calculations, algorithms, etc. when used as part of the specification or patent shall be understood as referring to the definitions of function, equation, calculation, etc. given here. ♠

Definition 5.3 (Calculation) In the context of forming computer or network algorithms, calculation means using a machine programmed for that purpose including a computer or if appropriate a computer. ♠

0 – 7.4 Practical utility of scenarios

From specification is the following extract which reviews papers and this work. Those of ordinary skill in the art of economic scenario generators would be familiar with the extensive use of economic scenario generators in actuarial work or financial services.

See Paragraph [030] of the specification as prepared by USPTO. This is page 14 of the pdf version of the specification, first column, section 2-6 [Actuarial Work].

0 – 7.5 Actuarial Work

American Academy of Actuaries. C3 Phase I and C3 Phase II use models for simulation of assets and liabilities for determining required capital.

See the work of Geoff Hancock of William Mercer and in Canadian Institute of Actuaries, Society of Actuaries and other meetings reporting on C3 Phase II and the Canadian OSFI regulations in this area. See Geoffrey Hancock on bring risk into capital management [64], as well as the other talks in that session, all collected into a pdf file by the SOA. See [103], [102] and at SOA [116], [88].

See also the reports of C3 Phase II of the American Academy of Actuaries [111], [113], and [115]. See also previous reports on Universal Valuation System (UVS) of the American Academy of Actuaries and on Equity Indexed Annuities of the same organization. See the work of Mary Hardy such as [65] for the above organizations and in her book on guarantees in insurance products [66]. A regime switching model for equity volatility and return is reported by Hardy and also by Hancock in the above and has been used by

these organizations. The above reports can be found by searching on their titles or authors or on the web pages of those organizations. The above are a selection of the material of these organizations and individuals that will be found from these searches.

See also Casualty Actuary Society papers and work on Dynamic Financial Analysis (DFA), as well as on interest rate models and stochastic simulation. See also papers of other actuarial organizations including the Institute and Faculty of Actuaries, and the International Actuarial Association. Also the ETH insurance, finance and mathematics group, and the actuarial department at the University of Waterloo.

0 – 7.6 Note on Actuarial Work

The specification is for one of ordinary skill in the art of economic scenario generators. Applicant has been teaching seminars or sessions on ESG (not always called that) for Society of Actuaries since the mid 1990's. There are extensive sessions and courses by others for SOA. Other vendors sell Economic Scenario Generators, as can be seen by searching on the term.

Results 1 - 100 of about 96,700 for "Economic Scenario Generator"

on Google.

Results 1 - 7 of 7 from actuary.org for "Economic Scenario" Tenney

Actuary.org is for American Academy of Actuaries which advises the NAIC, National Association of Insurance Commissioners. They prepare model laws for the states.

Results 1 - 14 of 14 from naic.org for "Economic Scenario".

Economic scenario files containing interest rates and or equity index values can be and are sold to companies. These computer readable files are used by them in cash flow projections in the different scenarios of asset and liabilities. These are used to determine if they stay solvent, i.e. can pay all their obligations in the scenarios. Insurance companies do monthly projections for 30 years. Banks have done value at risk calculations for 1 to 10 days. It was the banks that required the bailout from the US government in the recent financial crisis, except for AIG which had a financial products unit that managed to avoid state regulation.

Given scenarios of interest rates and equity prices, a financial institution can calculate the payments on its liabilities and the payments it receives from its assets and determine if it can make the payments in those scenarios. If they do 1000 scenarios, they can see if they make their payments in say 95 percent of them. If they do, then they are solvent at the 95th percentile level. Sometimes they use all their assets, and this tests capital adequacy. Sometimes a portion of assets are used and this tests reserve adequacy. In some form or another, whether required or not by regulations, insurance companies have been doing this type of testing since at least the mid 1990's and even earlier in some cases.

A further search

Results 1 - 12 of 12 from soa.org for "Economic Scenario" Tenney.

The NAIC is made of state insurance commissioners or their staff. They are typically not as sophisticated as actuaries in economic scenarios. Nonetheless, at the Sep 2009 meeting of the NAIC, economic scenario generators were discussed and the state employees had intelligent and thoughtful comments

on the Academy of Actuaries SLV ESG, which was presented at the LHATF session of the NAIC. The applicant is on the committee of the Academy of Actuaries that prepared the SLV model and that set proposed calibration rules for other ESG's to qualify to be used instead of the SLV model. The idea is that vendors and companies can develop better models than SLV and then companies get the benefit of that. The idea is that better ESG's will avoid costly bailouts, particularly ones that come from extended low rates when all the companies would need a bailout at once. The Regime Switching ESG's in this application, made in 2004, in fact allows for stress scenarios to be generated that the SLV model does not do. This includes high interest rates and short rates above long rates in 5 years. These can be stress conditions for companies. High rates means they lose money on bonds they buy now. Short rates above long rates means that they pay out high rates to keep customers but earn low rates on long term bonds if they buy those to lock in the higher rates available. Insurance companies make rate guarantees for decades in the future. So extended low rates can be a problem. The Regime

Switching ESG's of the type in the patent can produce extended low rate scenarios while at the same time meeting other calibration requirements for other types of scenarios and at the same time producing more yield curve inversions and high rates at the end of 5 years than the SLV and without disorting the scenarios by using extreme volatilities. Thus they are practical for insurance companies, customers who expect to be paid on their policies, state governments which can't bailout the whole insurance industry at once for extended low rates and the federal government which is already maxed out with its own many financial obligations.

**0 – 8 Applicant's arguments, see pgs 48-49 Objection
Withdrawn**

8. Applicant's arguments, see pgs. 48-49, filed 03/30/2009, with respect to claims 10-16 have been fully considered and are persuasive. The 101 rejection of claims 10-16 have been fully withdrawn.

**0 – 9 Applicant's arguments, see pgs 51-52 Objection
Withdrawn**

9. Applicant's arguments, see pgs 51-52, filed 03/30/2009, with respect to claims 1-16 have been fully considered and are persuasive. The objection of claims 10-16 has been withdrawn.

0 – 10 Rejections Below Comment

A review of the claims and updated search necessitated the rejections below.

Chapter 6

Claim Objections

6.1 Claims 1,8, and 18 Informalities

1. Claims 1,8, and 18 are objected to because of the following informalities:

The independent claims do not follow suggested USPTO format. See 37 CFR

1.75(e). Appropriate correction is quired.

1 – 1 Applicant response

The claims have been redrafted. Also studies show that the Jepson format is rarely contained in USPTO patents. For example, its not present in the i4i patent 5787449 in claim one or claim 14 of that patent, which was upheld by the CAFC in late 2009 including an injunction on Microsoft Word sales.

6.2 Claims 3,5, and 9 Informalities

2. Claims 3,5, and 9 are objected to because of the following informalities:

As stated previously, the guidelines for making claim amendments should be followed. Any words deleted should be shown as striked out and any words added should be shown as underlined. If striking out or underlining of words is too extensive or complicated a claim can be canceled and rewritten as new. Appropriate correction is required.

2 – 1 Applicant response

Claims are canceled and new claims are submitted.

6.3 Claims 2 Indefinite

3. Claim 2 is objected to as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 2 recites the limitation "the RS-VAR" in line 2. There is insufficient basis for the limitation in the claim. The preceding claim references an essential RS-VAR. The specification makes a distinction between an

RS-VAR and an Essential RS-VAR. Therefore the reference to the RS-VAR suffers from a lack of antecedent basis.

3 – 1 Applicant response

The claims were canceled and new claims submitted.

6.4 Claims 1-9 17-24 Indefinite

4. Claims 1-9 and 17-24 are objected to as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the present case, the claims do not delineate the steps required to simulate GFV variables using an essential RS-VAR. The examiner is forced to discern how this is done by referencing the specification, however, the examiner is precluded from importing limitations from the specification into the claims. As a result a reasonable search and complete examination by the examiner is not possible.

4 – 1 Applicant response

The applicant can be own lexicographer. The terms are defined in the specification. Thus its not a matter of importing limitations into the specification.

6.5 Note on obtaining representation

The examiner strongly suggests that the applicant retain a qualified patent attorney or agent or at the least consult available literature on claims construction and patent prosecution. It is in the applicant's best interest to obtain the best and broadest protection possible through proper claim construction and disclosure of the invention.

5 – 1 Applicant response

Applicant points out following

http://www.uspto.gov/web/offices/pac/mpep/documents/0700_707_07_j.htm

707.07(j) State When Claims Are Allowable [R-5] - 700 Examination of Applications 707.07(j) State When Claims Are Al-

lowable [R-5]

I. INVENTOR FILED APPLICATIONS

When, during the examination of a pro se application it becomes apparent to the examiner that there is patentable subject matter disclosed in the application, the examiner should draft one or more claims for the applicant and indicate in his or her action that such claims would be allowed if incorporated in the application by amendment.

This practice will expedite prosecution and offer a service to individual inventors not represented by a registered patent attorney or agent. Although this practice may be desirable and is permissible in any case deemed appropriate by the examiner, it will be expected to be applied in all cases where it is apparent that the applicant is unfamiliar with the proper preparation and prosecution of patent applications.

II. ALLOWABLE EXCEPT AS TO FORM

When an application discloses patentable subject matter and it is apparent from the claims and applicant's arguments that the claims are intended to be directed to such patentable subject matter, but the claims in their present form cannot be allowed because of defects in form or omission of a limitation, the examiner should not stop with a bare objection or rejection of the claims. The examiner's action should be constructive in nature and, when possible, should offer a definite suggestion for correction. Further, an examiner's suggestion of allowable subject matter may justify indicating the possible desirability of an interview to accelerate early agreement on allowable claims.

If the examiner is satisfied after the search has been completed that patentable subject matter has been disclosed and the record indicates that the applicant intends to claim such subject matter, the examiner may note in the Office action that certain aspects or features of the patentable invention have not been claimed

and that if properly claimed such claims may be given favorable consideration.

Chapter 7

Claim Rejections 35 U.S.C. Section 101

7.1 Claims 18-21 non statutory rejected

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvements thereof, may obtain a patent thereof, subject to the conditions and requirements of this title.

1. Claims 18-21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In the present case, neither a portfolio nor a financial product are considered statutory subject

matter. MPEP 2106 IV. B states:

The burden is on the USPTO to set forth a prima facie case of unpatentability. Therefore if USPTO personnel determine that it is more likely than not that the claimed subject matter falls outside all of the statutory categories, they must provide an explanation. For example, a claim reciting only a musical composition, literary work, compilation of data, signal, or legal document (e.g. an insurance policy) per se does not appear to be a process, machine, manufacture, or composition of matter.

1 – 1 Applicant response

Claims are canceled.

Chapter 8

Conclusion.

8.1 Action made final

This action is made final. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the

advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William E. Rankins whose telephone number is 571-270-3465. The examiner can normally be reached on M-F 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Dixon can be reached on 571 272 6803. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

1 – 1 Response to Made Final

1 – 1.1 MPEP 706 Rejection of Claims [R-5]

[http://www.uspto.gov/web/offices/pac/mpep/documents/0700_706.htm#](http://www.uspto.gov/web/offices/pac/mpep/documents/0700_706.htm#sect706)

sect706

II. DEFECTS IN FORM OR OMISSION OF A LIMITATION; CLAIMS OTHERWISE ALLOWABLE

When an application discloses patentable subject matter and it is apparent from the claims and the applicant's arguments that the claims are intended to be directed to such patentable subject matter, but the claims in their present form cannot be allowed because of defects in form or omission of a limitation, the examiner should not stop with a bare objection or rejection of the claims. The examiner's action should be constructive in nature and when possible should offer a definite suggestion for correction.

III. PATENTABLE SUBJECT MATTER DISCLOSED BUT NOT CLAIMED

If the examiner is satisfied after the search has been completed that patentable subject matter has been disclosed and the record indicates that the applicant intends to claim such subject matter, he or she may note in the Office action that certain aspects or features of the patentable invention have not been claimed and

that if properly claimed such claims may be given favorable consideration.

Applicant respectfully requests examiner to consider whether in light of this amendment and prior discussions, this is now the case.

1 – 1.2 MPEP 706.07 Final Rejection [R-3]

http://www.uspto.gov/web/offices/pac/mpep/documents/0700_706_07.htm#sect706.07

Before final rejection is in order a clear issue should be developed between the examiner and applicant. To bring the prosecution to as speedy conclusion as possible and at the same time to deal justly by both the applicant and the public, the invention as disclosed and claimed should be thoroughly searched in the first action and the references fully applied; and in reply to this action the applicant should amend with a view to avoiding all the grounds of rejection and objection. Switching from one subject matter to another in the claims presented by applicant in succes-

sive amendments, or from one set of references to another by the examiner in rejecting in successive actions claims of substantially the same subject matter, will alike tend to defeat attaining the goal of reaching a clearly defined issue for an early termination, i.e., either an allowance of the application or a final rejection.

Applicant respectfully requests the examiner to consider whether this does not characterize the office actions in this case. In particular, examiner himself in the interview with applicant specifically said the next action would not be final. Examiner wanted applicant to add to the specification and to modify the claims to make them longer and more explicit. Applicant has done as instructed in this amendment.

1 – 1.3 MPEP706.07(a) Final Rejection, When Proper on Second Action [R-6]

http://www.uspto.gov/web/offices/pac/mpep/documents/0700_706_07_a.htm

Under present practice, second or any subsequent actions on

the merits shall be final, except where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment of the claims, nor based on information submitted in an information disclosure statement filed during the period set forth in 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p).

Applicant respectfully submits that new rejections/objections were raised in the action made final and that it should not have been made final.

1 – 1.4 MPEP 707.07(g) Piecemeal Examination

http://www.uspto.gov/web/offices/pac/mpep/documents/0700_707_07_g.htm

707.07(g) Piecemeal Examination

Piecemeal examination should be avoided as much as possible.

Applicant respectfully requests examiner to look back at the record and see if this is not indicated in the record in this case. In particular, the first office action indicated that no examination was possible because of the

form of the specification being incomprehensible. However, prior to that date, USPTO had published the patent application in its format. Should not the rejections and objections raised in the latest action have been raised in the initial office action? Doesn't this make the record in this case piecemeal?

1 – 1.5 2111.01 Plain Meaning [R-5] IV. ; APPLICANT MAY BE OWN LEXICOGRAPHER

http://www.uspto.gov/web/offices/pac/mpep/documents/2100_2111_01.htm

An applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning by clearly setting forth a definition of the term that is different from its ordinary and customary meaning(s).

Applicant submits as argued earlier that the specification makes clear the limitation to a computer. Thus claim one for example is statutory in that it is directed to use of a computer and this was discussed earlier by quoting

from the specification to show that this was clearly defined as required and allowed by MPEP 2111.01 IV.

1 – 1.6 Extensive Revisions to comply with examiner comments

Applicant appreciates examiner's comments and work to analyze the patent and prepare examiner's comments. Applicant has considered these comments, objections and rejections carefully and has prepared new claims to conform with these objections and rejections to expedite the allowance of claims by examiners in view of the importance to the financial system of getting this technology into financial institutions during the crisis. Fed Chairman Bernanke praised the non-regime switching DMRP in 2004 and the regime switching version is better suited to the current conditions with a risk of a transition to high inflation, high interest rates and possibly short rates above long rates which puts extreme stress on banks and insurance companies. The non-regime switching version of DMRP has been used by financial institutions that are clients of applicant's company Mathematical Finance Company since the 1990's and also been provided by applicant to

the American Academy of Actuaries taskforce on Equity Indexed Annuities in the 1990's and Uniform Valuation System c. 2000 which is the precursor to the current insurance industry change to reserves and capital based on economic scenarios.

Examiner at time of the interview requested additions to the specifications as well to make the application more comprehensible to examiner and a wider audience. Applicant has considered this request carefully and has added extensive explanatory material that is much more approachable for the non-specialist and has a less steep learning curve. Applicant hopes this material will assist the examiner in his work of reviewing this patent.

8.2 Pairs

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system,

see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

2 – 1 Response

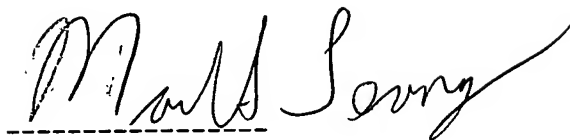
Applicant is educating himself on PAIR and has downloaded the forms to apply for registration.

Chapter 9

Closing

Respectfully submitted,

Mark S. Tenney

A handwritten signature in cursive script, reading "Mark S. Tenney", written over a dashed horizontal line.

703-799-0518 mfc@patriot.net Fax 703-799-4964 4313 Lawrence Street

Alexandria, VA 22309

Bibliography

- [1] Robert F. Dittmar Ahn, Dong-Hyun and A. Ronald Gallant. Quadratic term structure models: Theory and evidence. *Review of Financial Studies*, 15:243–288, 2002.
- [2] Yacine Ait-Sahalia. Testing continuous-time models of the spot rate. *The Review of Financial Studies*, 9:385–426, 1996.
- [3] Yacine Ait-Sahalia. Transition densities for interest rate and other nonlinear diffusions. *The Journal of Finance*, 54:1361–1395, August 1999.
- [4] Kaushik I. Amin and Robert Jarrow. Pricing foreign currency options under stochastic interest rates. *Journal of International Money Finance*, 10:310–329, 1991.

- [5] A. Ang. Short rate nonlinearities and regime switches.
- [6] Andrew Ang and Monika Piazzesi. A no-arbitrage vector autoregression of term structure dynamics with macroeconomic and latent variables. *Journal of Monetary Economics*, 50(4):745–787, 2003.
- [7] Ludwig Arnold. *Stochastic Differential Equations: Theory and Applications*. Krieger, Malabar, Florida, 1972.
- [8] Simon H. Babbs and K. Ben Nowman. Kalman filtering of generalized vasicek term structure models. *Journal of Financial and Quantitative Analysis*, 34(1):115–130, March 1999.
- [9] Simon H. Babbs and Nick Webber. Term structure modelling under alternative official regimes. In *Mathematics of Derivative Securities*, pages 394–422. Cambridge University Press, 1997.
- [10] Louis Bachelier. Theorie de la speculation (thesis). *Annales Scientifiques de l'Ecole Normale Supérieure*, I I I -17:21–86, 1900.

- [11] Pierluigi Balduzzi, Sanjiv Rajan Das, Silverio Foresi, and Rangarajan Sundaram. A simple approach to three-factor term structure models. *The Journal of Fixed Income*, 6:43–53, December 1996.
- [12] Pierluigi Balduzzi, Sanjiv Rajan Das, Silverio Foresi, and Rangarajan Sundaram. *Stochastic Mean Models of the Term Structure of Interest Rates*, chapter 5, pages 10–119. Wiley, New York, 2000.
- [13] Ravi Bansal, George Tauchen, and Hao Zhou. Regime-shifts, risk premiums in the term structure, and the business cycle. Technical Report 2003-21, Board of Governors of the Federal Reserve System, Washington, April 2003.
- [14] Ravi Bansal and Hao Zhou. Term structure of interest rates with regime shifts. *Journal of Finance*, 57:1997–2043, 2002.
- [15] Ravi Bansal and Hao Zhou. Ito conditional moment generator and the estimation of short rate processes. *Journal of Financial Econometrics*, 1:250–271, 2003.

- [16] Rolf Banz and Merton Miller. Prices for state contingent claims: Some estimates and applications. *Journal of Business*, pages 653–672, October 1978.
- [17] David Beaglehole and Mark Tenney. Multicurrency pricing. *Working paper, University of Chicago*, 1990.
- [18] David Beaglehole and Mark Tenney. Stochastic volatility. *Working paper, University of Chicago*, 1990.
- [19] David Beaglehole and Mark Tenney. General solutions to some interest rate contingent claims pricing equations. *Journal of Fixed Income*, September 1991.
- [20] David Beaglehole and Mark Tenney. Corrections and additions to, “a nonlinear equilibrium model of the term structure of interest rates”. *Journal of Financial Economics*, 32(3):345–354, December 1992.
- [21] Albert Turner Bharucha-Reid. *Elements of the Theory of Markov Processes and Their Applications*. McGraw-Hill, New York, New York,

1960.

[22] Fischer Black and Myron Scholes. The pricing of options and corporate liabilities. *Journal of Political Economy*, (8):637 – 654, 1973.

[23] Justin Bobo, Lee Tenney, and Mark S. Tenney. Stochastic asset generators for investment portfolios of bonds, stocks, real estate, commodities, and foreign assets based on the double mean reverting process and the vector autoregressive diffusion. Technical report, Mathematical Finance Company, Alexandria, Virginia, 1999.

[24] Tim Bollerslev and Hao Zhou. Volatility puzzles: A unified framework for gauging return-volatility regressions. Technical Report 2003-40, Board of Governors of the Federal Reserve System, Washington, August 2003.

[25] A. James Boness. Elements of a theory of stock-option value. *Journal of Political Economy*, 72(2):163–175, 1964.

- [26] Phelim Boyle and Ken Seng Tan. Applications of randomized low discrepancy sequences to the valuation of complex securities. *Journal of Economic Dynamics and Control*, 24(11-12):1747–82, 2000.
- [27] Phelim P Boyle. Options: A monte carlo approach. *Journal of Financial Economics*, 4:323–38, 1977.
- [28] Phelim P Boyle, Mark Broadie, and Paul Glasserman. Monte-carlo methods for security pricing. *Journal of Economic Dynamics and Control*, 21:1267–1321, 1997.
- [29] Douglas T. Breeden and Robert H. Litzenberger. Prices of state-contingent claims implicit in option prices. *Journal of Business*, 51:621–651, 1978.
- [30] George Chacko and Sanjiv Rajan Das. Pricing interest rate derivatives: A general approach. *The Review of Financial Studies*, 15:195–241, 2002.

- [31] Don Chance. Bibliography of term structure and interest rate derivatives literature. Technical report, Louisiana State University, 2004.
- [32] Lin Chen. *A Three Factor Model of the Term Structure of Interest Rates*. PhD dissertation, Harvard University, Department of Economics, January 1995.
- [33] Lin Chen. *Interest Rate Dynamics, Derivatives Pricing, and Risk Management*. Springer-Verlag, Berlin Heidelberg, 1996.
- [34] Ren-Raw Chen and Louis Scott. Pricing interest rate options in a two factor cox-ingersoll-ross model of the term structure. *Review of Financial Studies*, 5:613–636, 1992.
- [35] George Constantinides. A theory of the nominal term structure of interest rates. *Review of Financial Studies*, 5(4):531–552, 1992.
- [36] John Cox, Jonathon Ingersoll, and Stephen A. Ross. The relation between forward prices and futures prices. *Journal of Financial Economics*, (9):321–346, December 1981.

- [37] John Cox, Jonathon Ingersoll, and Stephen A. Ross. An intertemporal general equilibrium model of asset prices. *Econometrica*, 53(2):363–384, March 1985.
- [38] John Cox, Jonathon Ingersoll, and Stephen A. Ross. A theory of the term structure of interest rates. *Econometrica*, 53(2):385–407, 1985.
- [39] John Cox and Stephen A. Ross. The valuation of options for alternative stochastic processes. *Journal of Financial Economics*, 3:145–66, 1976.
- [40] Steven Craighead and Mark S. Tenney. Economic scenario generator for insurance and pension rational decision making under uncertainty. Technical report, Society of Actuaries, September 1997.
- [41] Qiang Dai and Kenneth Singleton. Fixed income pricing. In George Constantinides, Michael Harris, and Rene Stulz, editors, *Handbook of Economics and Finance*. North Holland, San Diego, California 92101, 2003.

- [42] Qiang Dai and Kenneth Singleton. Term structure dynamics in theory and reality. *The Review of Financial Studies*, 16(3):631–678, Fall 2003.
- [43] Sanjiv Ranjan Das. *Interest Rate Shocks, Characterizations of the Term Structure and the Pricing of Interest Rate Sensitive Contingent Claims*. PhD dissertation, New York University, Stern School of Business, July 1994.
- [44] Micheal Davlin and Mark Tenney. Pricing with stochastic exchange and interest rates. *Unpublished paper*,, 1997-2003.
- [45] Darrell Duffie. *Dynamic Asset Pricing Theory*. Princeton University Press, Princeton, third edition, 2001.
- [46] Darrell Duffie and Rui Kan. A yield factor model of interest rates. *Mathematical Finance*, 6:379–406, 1996.
- [47] Darrell Duffie, Jun Pan, and Kenneth Singleton. Transform analysis and asset pricing for affine jump diffusions. *Econometrica*, 68:1343–1376, 2000.

- [48] Darrell Duffie and Kenneth Singleton. *Credit Risk: Pricing, Measurement and Management*. Princeton University Press, Princeton, 2003.
- [49] Darrell Duffie and Domingo Tavella, editors. *First Annual Computational Finance Conference at Stanford*, New York and Palo Alto, California, August 1996. International Association of Financial Engineers and Stanford University.
- [50] Paul Embrechts, Filip Lindskog, and Alexander McNeil. Correlation and dependence in risk management: properties and pitfalls. In M.A.H. Dempster, editor, *Risk Management: Value at Risk and Beyond*. Cambridge University Press, Cambridge University Press, 2002.
- [51] Adrian Luis Eterovic. *Essays on multifactor models of the term structure of interest rates*. PhD dissertation, Harvard University, Department of Economics, May 1994.
- [52] Peter Fitton. *A Green's Function Finite Difference Method and Applications to Security Valuation*. Master's thesis, University of Waterloo,

May 1995.

- [53] Mark Garman. A general theory of asset valuation under diffusion state processes. Technical report, Berkeley, 1976.

- [54] Mark Garman and Steven Kohlhagen. Foreign currency option values. *Journal of International Money and Finance*, 2(3):231–237, December 1983.

- [55] Donald P. Groover. Cope^R: A trading quality system. *Chalke: PTS Newsletter*, June 1992.

- [56] Donald P. Groover and Mark S. Tenney. Comparison of cope^R and the lognormal model: Out of sample pricing of treasury bonds. *Chalke: PTS Newsletter*, April 1992.

- [57] Donald P. Groover and Mark S. Tenney. Cope^R: Application in project finance. *Chalke: PTS Newsletter*, September 1992.

- [58] Nils Hakansson. *Optimal Investment and Consumption Strategies for a class of Utility Functions*. PhD dissertation, UCLA, Department of Economics, June 1966.
- [59] Nils H. Hakansson. Optimal investment and consumption strategies under risk for a class of utility functions. *Econometrica*, 38(5):587–607, September 1970.
- [60] James D. Hamilton. Rational expectations econometric analysis of changes in regime: An investigation of the term structure of interest rates. *Journal of Economic Dynamics and Control*, 13:385–423, June/Sept. 1988.
- [61] James D. Hamilton. A new approach to the economic analysis of non-stationary time series and the business cycle. *Econometrica*, 57(2):357–84, 1989.
- [62] James D. Hamilton. *Time Series Analysis*. Princeton University Press, Princeton, 1994.

- [63] James D. Hamilton and Baldev Raj. *Advances in Markov-Switching Models Applications in Business Cycle Research and Finance*. Studies in Empirical Economics. Springer, Heidelberg and Berlin, 2002.
- [64] Geoffrey Hancock. Bringing risk into capital management: Capital measures for variable annuities with guarantees, session 240f. In *Spring 2003 Meeting Washington*. Society of Actuaries, May 2003.
- [65] Mary Hardy. A regime switching model of long term stock returns. *North American Actuarial Journal*, 5(2):41–53, April 2001.
- [66] Mary Hardy. *Investment Guarantees: The New Science of Modeling and Risk Management for Equity-Linked Life Insurance*. John Wiley & Sons, Hoboken, New Jersey, 2003.
- [67] J.M. Harrison and David Kreps. Martingales and arbitrage in multi-period securities markets. *Journal of Economic Theory*, 20:381–408, July 1979.

- [68] J.M. Harrison and S. Pliska. Martingales and stochastic integrals in the theory of continuous trading. *stochastic processes and their applications*, 11:215–60, 1981.
- [69] J.M. Harrison and S. Pliska. A stochastic calculus model of continuous trading: complete markets. *stochastic processes and their applications*, 15:313–16, 1983.
- [70] David Heath, Robert Jarrow, and Andrew Morton. Bond pricing and the term structure of interest rates: A new methodology for contingent claim valuation. *Econometrica*, 60(1):77–105, 1992.
- [71] Steven L. Heston. A closed-form solution for options with stochastic volatility with applications to bond and currency options. *Review of Financial Studies*, 6(2):327–343, 1993.
- [72] Thomas Ho and S. Lee. Term structure movements and pricing interest rate contingent claims. *Journal of Finance*, 41:1011–29, 1986.
- [73] Marjorie Hogan and Michael Hogan. Private communication, 1987.

- [74] John Hull and Alan White. Pricing interest rate derivative securities. *Review of Financial Studies*, 3(4):573–592, 1990.
- [75] Jonathan Ingersoll. *Theory of Financial Decision Making*. Rowman and Littlefield, Totowa, New Jersey, 1987.
- [76] Jonathan E. Jr. Ingersoll. Contingent foreign exchange contracts. Technical report, Yale, 1989.
- [77] Farshid Jamshidian. Pricing of contingent claims in the one factor term structure model. Technical report, Merrill Lynch, 1987.
- [78] Farshid Jamshidian. Pricing of contingent claims in the one factor term structure model. Technical report, Merrill Lynch, 1987.
- [79] Farshid Jamshidian. An exact bond option formula. *Journal of Finance*, 44:205–209, 1989.
- [80] Farshid Jamshidian. The multifactor gaussian interest rate model and implementation. Technical report, Merrill Lynch, 1989.

- [81] Farshid Jamshidian. Bond, futures, and option evaluation in the quadratic interest rate model. Technical report, Fuji International Finance PLC, 7-11 Finsbury Circus, London EC2M 7NT, March 1993.
- [82] Farshid Jamshidian. Hedging quantos, diff swaps, and ratios. Technical report, Fuji International Finance PLC, 7-11 Finsbury Circus, London EC2M 7NT, 1993.
- [83] Farshid Jamshidian. A simple class of square-root interest rate models. Technical report, Fuji International Finance PLC, 7-11 Finsbury Circus, London EC2M 7NT, March 1993.
- [84] Hans-Jurgen Knoch. The pricing of foreign currency options with stochastic volatility. *Working Paper*, April 1990.
- [85] Paul Krugman. Target zones and exchange rate dynamics. *Working Paper*, (2481), 1988.
- [86] Richard Kruizenga. *PUT AND CALL OPTIONS: A THEORETICAL AND MARKET ANALYSIS*. PhD dissertation, MIT, Department of

Economics, 1956.

- [87] Clarence Langetieg. A multivariate model of the term structure. *Journal of Finance*, 35(1):71–97, March 1980.
- [88] Dominique Lebel, Geoffrey Hancock, and Jeffrey Leitz. Risk based capital guarantees on variable annuities with guarantees session 91 of orlando annual meeting. *Record*, 29(3), October 2003.
- [89] Markus Leippold and Lauren Wu. Asset pricing under the quadratic class. *Journal of Financial and Quantitative Analysis*, 37(2):271–295, 2002.
- [90] Francis A. Longstaff. A nonlinear general equilibrium model of the term structure of interest rates. *Journal of Financial Economics*, 23:195–224, 1989.
- [91] Francis A. Longstaff. The valuation of options on yields. *Journal of Financial Economics*, 26:97–121, 1990.

- [92] Francis A. Longstaff and Eduardo S. Schwartz. Interest rate volatility and the term structure: A two-factor general equilibrium model. *Journal of Finance*, 47:1259–1282, 1992.
- [93] Robert E. Lucas. Asset prices in an exchange economy. *Econometrica*, 46(6):1426–1446, 1978.
- [94] John Manistre. A geometric approach to exact solutions in finance and actuarial science. Technical report, Society of Actuaries, August 1997.
- [95] Henry P. McKean. Appendix: A free boundary problem for the heat equation arising from a problem in mathematical economics. *Industrial Management Review*, 32(9), Spring 1965.
- [96] Robert C. Merton. A dynamic general equilibrium model of the asset market and its application to the pricing of the capital structure of the firm. Technical report, A. P. Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1970.

- [97] Robert C. Merton. An intertemporal capital asset pricing model. *Econometrica*, 41:867–887, September 1973.
- [98] Robert C. Merton. The theory of rational option pricing. *Bell Journal of Economics and Management Science*, 4:141–183, 1973.
- [99] Robert C. Merton. *Continuous-Time Finance*. Basil Blackwell, Cambridge, Massachusetts 02142, 1990.
- [100] Roger B. Nelsen. *An Introduction to Copulas*. Springer-Verlag, New York, 1998.
- [101] Harald Niederreiter. *Random Number Generation and Quasi-Monte Carlo Methods*. Society of Industrial and Applied Mathematics, Philadelphia, 1992.
- [102] Committee on Life Insurance Financial Reporting. Selection of interest rate models. Technical Report 203106, Canadian Institute of Actuaries, December 2003.

- [103] CIA Task Force on Segregated Funds Investment Guarantees. Final report. Technical Report 202012, Canadian Institute of Actuaries, March 2002.

- [104] Jun Pan. *Jump-Diffusion Models of Asset Prices: Theory and Empirical Evidence*. PhD dissertation, Stanford University, Graduate School of Business, May 2000.

- [105] Joseph F. Paskov and Anargyros Papageorgiou. New results on deterministic pricing of financial derivatives. Technical report, CUCS-028-96 Computer Science, Columbia University, 1996.

- [106] Rajni V. Patel, Alan J Laub, and Paul M. Van Dooren. *Numerical Linear Algebra Techniques for Systems and Control*. IEEE Press, 445 Hoes Lane, PX Box 1331, Piscataway, NJ 08855-1332, 1993.

- [107] Monika Piazzesi. *Essays on Monetary Policy and Asset Pricing*. PhD dissertation, Stanford University, Department of Economics, 2003.

- [108] Scott Richard. An arbitrage model of the term structure of interest rates. *Journal of Financial Economics*, (6):33–57, 1978.
- [109] Paul A. Samuelson. Rational theory of warrant pricing. *Industrial Management Review*, 32(9), Spring 1965.
- [110] Albert Nikolaevich Shiryaev. *Probability*. Springer, Heidelberg, Berlin, second edition, 1996.
- [111] Albert Nikolaevich Shiryaev. *Essentials of Stochastic Finance: Facts, Models, Theory*. World Scientific, Singapore, 1999.
- [112] Case Sprenkle. *Warrant Prices as Indicators of Expectations and Preferences*. PhD dissertation, Yale University, Department of Economics, 1960.
- [113] Life Capital Adequacy Subcommittee. Recommended approach for setting regulatory risk-based capital requirements for variable products with guarantees (excluding index guarantees). Technical report, American Academy of Actuaries, December 2002.

- [114] Life Capital Adequacy Subcommittee. Progress report: C3 phase ii. Technical report, American Academy of Actuaries, June 2003.
- [115] Life Capital Adequacy Subcommittee. Recommended approach for setting regulatory risk-based capital requirements for variable products with guarantees (excluding index guarantees). Technical report, American Academy of Actuaries, December 2003.
- [116] Risk Management Task Force: Equity Modelling Subgroup. Modelling and managing equity risk: Recommended reading list. Technical report, Society of Actuaries, May 15 2003.
- [117] Mark S. Tenney. Stochastic interest rate parity. *Working Paper, University of Chicago*, 1989.
- [118] Mark S. Tenney. The double mean reverting processTM. Technical report, 4313 Lawrence Street, Alexandria, Virginia 22309, 1995.
- [119] Mark S. Tenney. The green's function numerical methodTM. Technical report, Society of Actuaries, 4313 Lawrence Street, Alexandria,

Virginia 22309, 1995.

- [120] Mark S. Tenney. The green's function numerical methodTM. In Darrell Duffie and Domingo Tavella, editors, *First Annual Computational Finance Conference at Stanford*, New York and Palo Alto, California, August 1996. International Association of Financial Engineers and Stanford University.

- [121] Mark S. Tenney. Discrepancy and discrepancies in monte carlo. Technical report, Mathematical Finance Company, 4313 Lawrence Street, Alexandria, Virginia 22309, June 2003.

- [122] Stuart M. Turnbull and Angelo Melino. Pricing foreign currency options with stochastic volatility. *Journal of Econometrics*, 3:239–265, 1990.

- [123] Stuart M. Turnbull and Angelo Melino. The pricing of foreign currency options. *Canadian Journal of Economics*, 3:251–281, May 1991.

- [124] Stuart M. Turnbull and Frank Milne. A simple approach to interest-rate option pricing. *Review of Financial Studies*, 4(1):87–120, 1991.
- [125] Oldrich Vasicek. An equilibrium characterization of the term structure. *Journal of Financial Economics*, (5):177–188, 1977.
- [126] Gary Venter. Quantifying correlation with copulas. *Guy Carpenter*, 2003.
- [127] Hao Zhou. Jump-diffusion term structure and its conditional moment generator. Technical Report 2001-28, Board of Governors of the Federal Reserve System, Washington, April 2001.